3. PLANNING DATA AND DEMAND

General planning information for the utility is given in this chapter. A discussion of the State Growth Management Act and its influence upon the utility service area is provided. It is followed by a summary of current and future land uses, current and future population, water use characteristics and demand forecast.

3.1 GROWTH MANAGEMENT ACT

The State Legislature passed the Growth Management Act (GMA) in 1990 to require local governments in rapidly growing cities and counties to plan for projected growth. The GMA encourages urban growth areas (UGA) that can be supported with adequate facilities, and it encourages setting aside other areas for rural uses and resource protection. Local communities are required to design UGAs to include "areas and densities sufficient to accommodate the county's expected growth for the succeeding 20 years" (GMA, Section 12, RCW 36.70A.12)). Communities will review and revise their plan every ten years to assure that projected growth can be accommodated.

The City has established UGAs, and Lewis County has folded their planning boundaries into the county comprehensive plan. These growth boundaries have been coordinated with the water utility service area to assure support of the community's planned growth without decreasing the level of service to our customers.

3.2 SERVICE AREA

The County provides water service to customers within the water service area shown in Figure 1.1. This area is made up of land within the City limits, City UGA and Lewis County. This service area is not anticipated to change in the foreseeable future.

3.3 LAND USE AND ZONING

A summary of the existing and future land use of the service area is provided in Table 3.1 and Figure 3.1. A comprehensive discussion of the City's UGA and land use is available in the City of Vader's Comprehensive Plan, 2010. Information for land use in the service area was from Lewis County GIS. No change in land use is projected.

TABLE 3.1 – LAND USE DISTRIBUTION

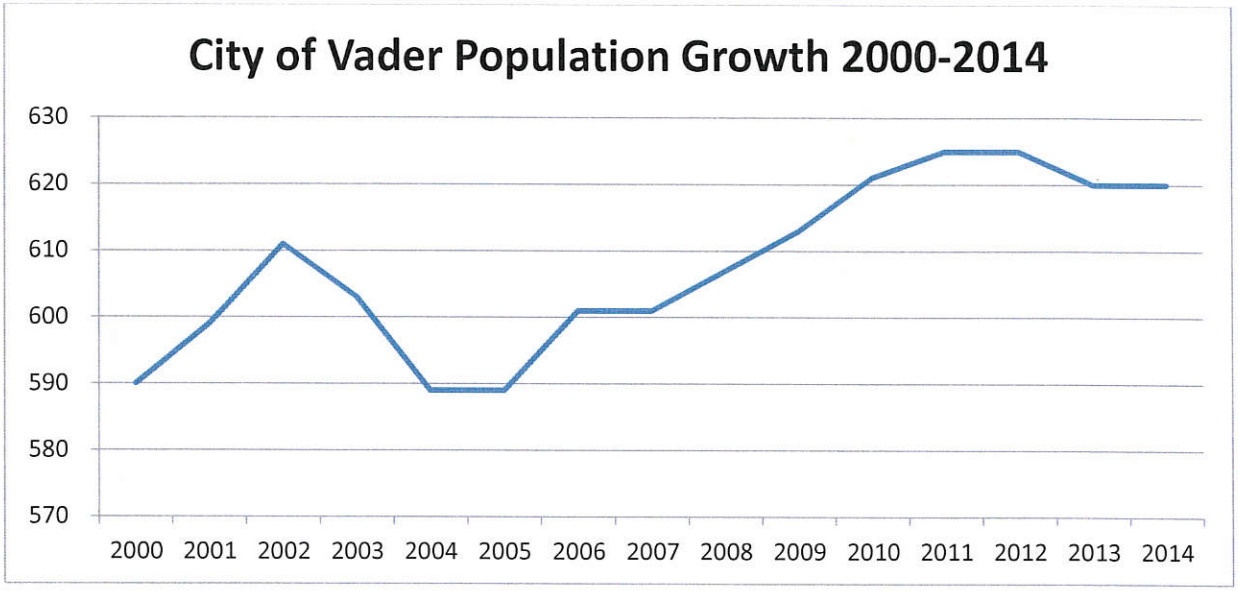
LAND USE DESCRIPTION	EXISTING		FUTURE	
	ACREAGE	PERCENT	ACREAGE	PERCENT
Residential	960.9	82.8	960.9	82.8
Commercial	120.7	10.4	120.7	10.4
Industrial	31	2.7	31	2.7
Community Services	47.3	4.1	47.3	4.1
TOTAL	1159.9	100.0	1159.9	100.0

3.4 POPULATION

3.4.1 Historical Population

The State Office of Financial Management (OFM) estimates the population within each county using U.S. Census Bureau data. County and city governments in each county then allocate the projected population to the cities and unincorporated areas in their county.

The city population in the last fourteen years ranged from 589 to 625 people. The peak population was 625 in 2011 and 2012, and it dropped to 620 in 2013 and 2014. The line graph shows the historical trend in population growth for the City of Vader based using OFM data.



Our service area also includes EVCC and county UGA areas of which populations in these areas are listed in OFM's category of unincorporated Lewis County. These areas represent a small portion of unincorporated Lewis County. The unincorporated county population values were analyzed to see if the Vader growth followed a countywide trend and if any growth was projected in the unincorporated areas. The data shows a trend of insignificant population growth in the last three years similar to the Vader graph. The population data is also presented in Table 3.2.

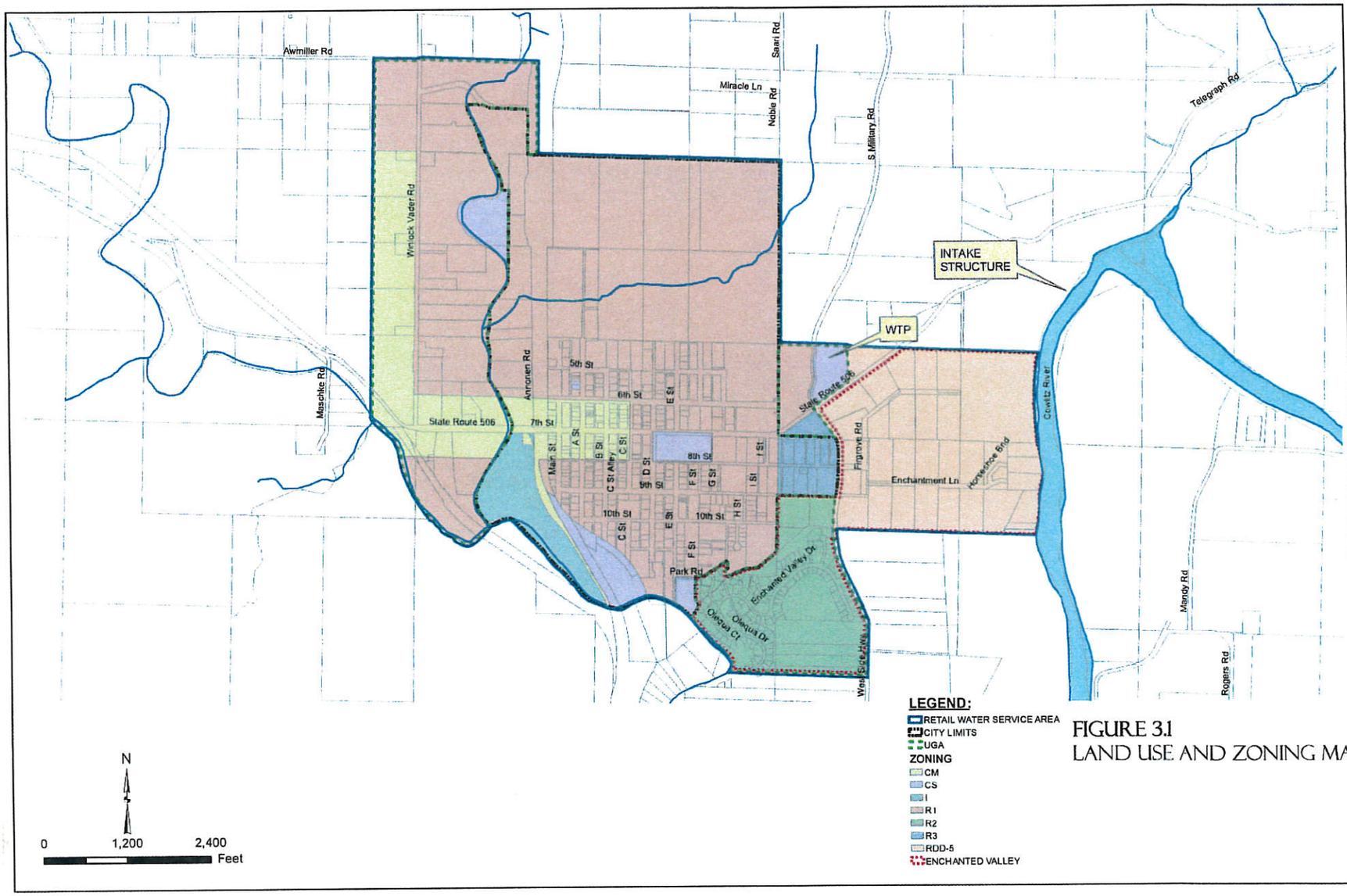


FIGURE 3.1
LAND USE AND ZONING MAP

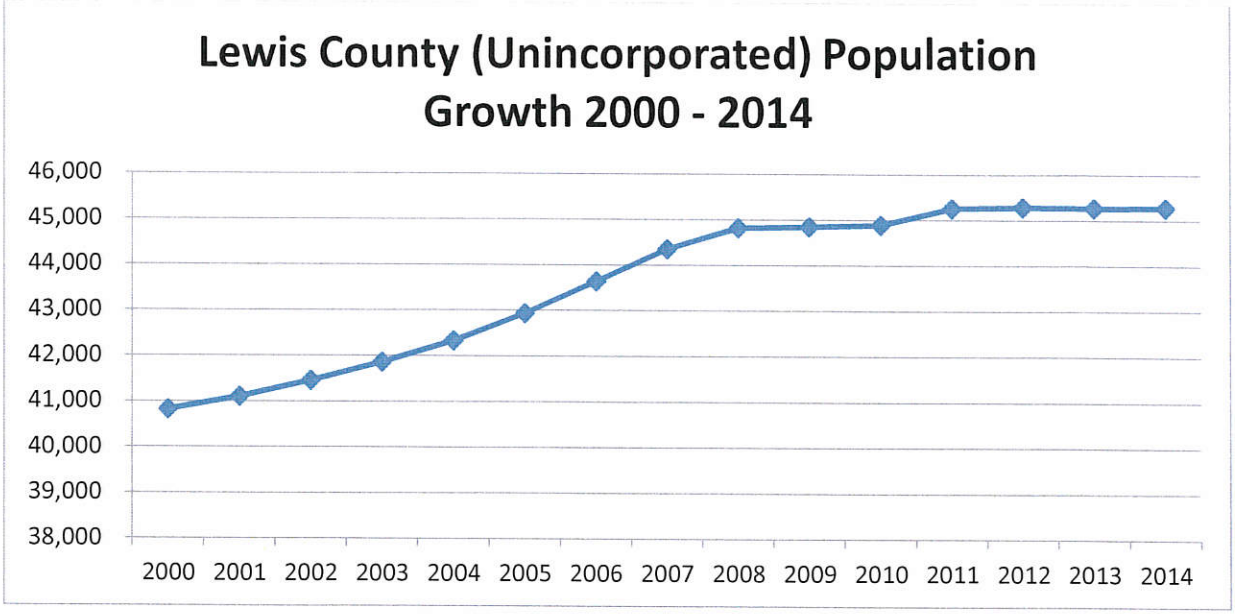


TABLE 3.2 – HISTORICAL POPULATION				
	CITY OF VADER		LEWIS COUNTY, UNINCORPORATED	
YEAR	POPULATION	ANNUAL GROWTH (%)	POPULATION	ANNUAL GROWTH (%)
2000	590	-	40,821	-
2001	599	1.5	41,102	0.7
2002	611	2.0	41,456	0.9
2003	603	-1.3	41,856	1.0
2004	589	-2.3	42,334	1.1
2005	589	0	42,935	1.4
2006	601	1.8	43,637	1.6
2007	601	0	44,352	1.6
2008	607	1.0	44,822	1.0
2009	613	1.0	44,849	0.06
2010	621	1.3	44,892	0.09
2011	625	0.6	45,260	0.8
2012	625	0	45,285	0.05
2013	620	-0.8	45,270	-0.03
2014	620	0	45,280	0.02

The water system serves residents in the EVCC area which is outside of Vader limits. The EVCC water system, before it was purchased and included into the Vader system, was approved for 107 connections according to DOH records. Since operation of the system, the number of accounts in EVCC has ranged from 89 to 102 accounts with an average of 96 accounts. This information is based on utility billing records with a higher degree of confidence placed on records from 2011. The EVCC was developed for single family residences and the EVCC service area has remained the same since the 1970s.

The population of our service area was determined using OFM data and the approved average number of connections for EVCC. Table 3.3 estimates the population based on water customer records and the national average household size of 2.43 people per household (2010 Census, www.census.gov).

TABLE 3.3 – CUSTOMER POPULATION								
YEAR	CONNECTIONS					POPULATION		
	City SFR	EVCC SFR	Total SFR	Commercial	Total	City*	EVCC*	Total
2010	233	89	322	12	334	566	216	782
2011	247	90	337	14	351	600	219	819
2012	247	94	341	14	355	600	228	828
2013	244	96	340	15	355	593	233	826
2014	245	99	344	15	359	595	241	836
2015	249	98	347	14	361	605	238	843

*Single Family Residential Population is based at 2.43 people/connection.

3.4.2 Projected Population

A growth rate of 2.5% was used in the 2008 WSP so our analysis assumed this 2.5% projection. Table 3.4 tabulates a population projection based on a growth rate of 2.5%, and number of single family service connections based on 2.43 people per household.

Table 3.4 also tabulates projections for population and service connection based on an adjusted growth rate. An adjustment to 1.2% was considered because of: 1) the economic downturn that started in 2008 and subsequent slow recovery; 2) the alignment of the UGA boundaries for this population forecast with the current service area boundaries; and 3) the dissolution of the Vader school district in 2007. All of these factors indicate slow economic growth of the area.

Both of these projections are tabulated in Table 3.4 for comparison.

TABLE 3.4 – PROJECTED POPULATION								
Year	Population at 2.5%				Population at 1.2%			
	Existing	Projected	Total	#SF Connections	Existing	Projected	Total	#SF Connections
2015	**843**	**0**	**843**	**347**	**836**	**0**	**836**	**347**
2016	843	21	864	356	846	10	856	351
2017	864	22	886	365	856	10	866	355
2018	886	22	908	374	866	10	877	360
2019	908	23	931	383	877	11	887	364
2020	931	23	954	393	887	11	898	368
2021	**954**	**24**	**978**	**402**	**898**	**11**	**909**	**373**
2022	978	24	1002	412	909	11	920	377
2023	1002	25	1027	423	920	11	931	382
2024	1027	26	1053	433	931	11	942	386
2025	1053	26	1079	444	942	11	953	391
2026	1079	27	1106	455	953	11	965	396
2027	1106	28	1134	467	965	12	976	400

2028	1134	28	1162	478	976	12	988	405
2029	1162	29	1191	490	988	12	1000	410
2030	1191	30	1221	503	1000	12	1012	415
2031	1221	31	1251	515	1012	12	1024	420
2032	1251	31	1283	528	1024	12	1036	425
2033	1283	32	1315	541	1036	12	1049	430
2034	1315	33	1348	555	1049	13	1061	435
2035	**1348**	**34**	**1381**	**569**	**1061**	**13**	**1074**	**440**

3.5 WATER USE CHARACTERISTICS

3.5.1 Production and Peaking Factor

The utility uses a billing year instead of a calendar year. Water billings are made on even numbered months and on a bimonthly cycle so a billing year is from December of the preceding year through November of that year.

Water production data is collected daily from the source meter at the Plant. Table 3.5 shows the annual production of water from 2010 to 2015 as gallons and as average day which is the annual production divided by 365 days. Table 3.6 shows the monthly production of water from 2011 to 2015. Data for the billing year 2010 is presented for comparison purposes in Table 3.5; and is not used in this WSP to derive existing system characteristics and forecasting.

TABLE 3.5 – ANNUAL WATER PRODUCTION

YEAR	TOTAL ANNUAL PRODUCTION (gallons)	AVERAGE DAY (gpd)
2010*	39,401,200	107,948
2011	31,194,300	85,464
2012	30,510,700	83,591
2013	29,288,600	80,243
2014	26,418,900	72,381
2015	18,639,800	51,068
3 yr Average	**24,782,433**	**67,897**

*2010 – 2012 data is shown for comparison purposes only and not used in the average values.

Table 3.5 shows decreasing water production since county management of the water utility in 2011. This is primarily due to the repairs of numerous leaky mains and service lines. Compared to 2010, we have reduced production of about 21 MG/yr (=39,401,200-18,639,800 gal) or about 53% of the 2010 water production volume.

TABLE 3.6 – 2011 to 2014 MONTHLY PRODUCTION					
MONTH	2011 (gallons)	2012 (gallons)	2013 (gallons)	2014 (gallons)	2015 (gallons)
December	2,833,700	2,392,500	2,442,500	2,574,300	1,318,300
January	2,905,400	2,348,700	2,567,700	2,387,600	1,558,200
February	2,476,800	2,194,600	2,135,000	2,185,100	1,264,200
March	2,704,200	2,549,000	2,393,200	2,551,100	1,469,800
April	2,913,600	2,300,200	2,297,000	2,446,500	1,400,700
May	2,654,100	2,475,300	2,488,800	2,527,600	1,639,500
June	2,677,700	2,613,200	2,628,700	2,487,300	2,201,800
July	2,697,400	2,809,800	2,840,800	2,791,200	1,982,400
August	2,589,900	2,980,600	2,654,600	1,873,900	1,850,800
September	2,365,800	2,794,900	2,273,400	1,604,700	1,364,900
October	2,201,800	2,685,900	2,305,600	1,603,400	1,257,100
November	2,173,900	2,366,000	2,261,300	1,386,200	1,332,100
TOTAL	**31,194,300**	**30,510,700**	**29,288,600**	**26,418,900**	**18,639,800**

Table 3.7 shows the maximum day versus average day usages for 2011 to 2015, and the resultant peaking factors. This information is derived from daily production records.

TABLE 3.7 – PEAKING FACTOR OF MAXIMUM DAY TO AVERAGE DAY				
YEAR	AVERAGE DAY (gpd)	MAXIMUM DAY (gpd)	MAXIMUM DAY (gpm)	PEAKING FACTOR
2011	85,464	110,300	77	1.3
2012	83,591	114,400	79	1.4
2013	80,243	107,700	75	1.3
2014	72,381	126,200	88	1.7
2015	51,068	131,200	91	2.6
3 yr Average	**74,549**	**117,960**	**82**	**1.7**

3.5.2 Customer Categories, Connections and Consumption

Consumption data is collected bimonthly from service meter readings. The billing categories are residential, commercial and others. The latter category is for approved hydrant withdrawals. Table 3.8 shows the annual consumption by customer classifications for the last three billing years.

TABLE 3.8 – CONSUMPTION BY CUSTOMER CLASSIFICATION								
REVENUE WATER, BILLED AUTHORIZED CONSUMPTION								
YEAR	RESIDENTIAL		COMMERCIAL		OTHERS*		TOTAL	
	(gallons)	%	(gallons)	%	(gallons)	%	(gallons)	%
2011	13,758,059	95.7	613,410	4.2	0	0	14,371,469	100
2012	14,157,392	93.8	525,040	3.5	415,000	2.7	15,097,432	100
2013	13,822,306	94.2	762,699	5.2	95,000	0.6	14,680,005	100
2014	14,688,279	91.6	731,420	4.5	623,045	3.9	16,042,744	100

2015	15,239,952	96	444,089	2.8	198,200	1.2	15,882,241	100%

*Contractor Water Sales/Fire Usage

Table 3.9 shows the number of service connections. Some of the residential connections have no water usage because of either vacancies or our customers' wish to keep a water connection. The majority of the customer base and water usage is residential. There are no large apartment complexes so the use of residential connections is a good direct correlation with the number of households in the service area.

The largest commercial users are the City of Vader wastewater treatment plant and buildings, Little Crane restaurant, local grocery stores, and the Cowlitz-Lewis County Fire District #20 facilities.

TABLE 3.9 – NUMBER OF CONNECTIONS

YEAR	RESIDENTIAL W/ USAGE	RESIDENTIAL W/O USAGE	TOTAL RESIDENTIAL	COMMERCIAL	TOTAL
2011	329	8	337	14	351
2012	338	3	341	14	355
2013	331	9	340	15	355
2014	333	11	344	15	359
2015	336	11	347	14	361

3.5.3 Water Balance and Leakage

A water balance is an accounting of all water that is produced. The Utility's 2015 water balance is shown in Table 3.10. The table is a slightly modified version of the format recommended for use by the American Water Works Association (AWWA).

TABLE 3.10 – 2015 WATER BALANCE

	Level 1	Level 2	Level 3	Volume (gallons)	% of Produced Water
Water Produced	Revenue Water	Billed Authorized Consumption	1. Billed Water Exported	0	0%
			2. Billed Metered Consumption	15,684,041	84.1%
			3. Billed Unmetered Consumption	109,500*	.0.6%
	Non-Revenue Water	Unbilled Authorized Consumption	4. Unbilled Metered Consumption	1,331,400**	7.14%
			5. Unbilled Unmetered Consumption	88,700***	0.5%
		Apparent Losses	6. Unauthorized Consumption	0	0%
			7. Customer Meter Inaccuracies	0	0%
		Real Losses	8. Known Leakage	0	0%
			9. Assumed Leakage	1,426,159	7.65%
TOTAL				18,639,800	100%

* Billed to Lewis County Public Works for water truck usage
** Filter Backwash
*** Fire Usage (estimated on usage based on subtracting firefighting water usage from normalized usage)

The water balance allocates the water produced to different categories at three different levels.

Level 1 allocates the water to either Revenue Water or Non-Revenue Water. As implied by the names, Revenue Water generates income while Non-Revenue water does not. This is helpful to understand how much water production generates income for the Utility and how much non-revenue water production needs to be considered into the demand forecast. The Utility's 2013 water production is divided into 50.1% Revenue Water and 49.9% Non-Revenue Water.

Level 2 splits Non-Revenue Water into three sub-categories which are useful to identify future revenue sources and the magnitude of losses that could be addressed.

- Unbilled Authorized Consumption includes uses such as water system flushing, firefighting, and unbilled contractor use. Typically, it is standard practice not to charge for uses in this category; but it is a good practice to review these uses to ensure a legitimate revenue opportunity is not missed. Losses from repairs are estimated and included in this sub-category.

- Apparent Losses include unauthorized uses and meter inaccuracies which are both lost revenue opportunities.

- Real Losses include various types of system leaks. A certain level of leakage is unavoidable; but leakage beyond that level should be repaired to avoid unduly burdening both the natural resource and the physical infrastructure. Any amount that cannot be assigned to another category is considered a loss under the AWWA's protocol and per the formula for calculating distribution system leakage under the State's Water Use Efficiency Rule.

Level 3 further splits water into additional sub-categories to support further estimation and water management.

Table 3.11 shows a longer history of other water balance elements, namely system distribution leakage and non-revenue water. Non-revenue water loss is defined as the difference between metered source production and authorized usage. Authorized usage includes revenue and non-revenue consumption. Non-revenue water losses can be from leaks, illegal service connections, unbilled service connections, meter inaccuracies, meter reading errors, calculation errors, unreported fire-fighting (hydrant) uses, incomplete closure of valves, and faulty valves and related assemblies.

Table 3.11 lists the non-revenue water losses from 2011 to 2015. The three-year average water loss is about 27%% , however, the water system repaired a long standing leak of approximately 30,000 gallons per day on August 4th, 2014. This is reflected in a large reduction in water loss in

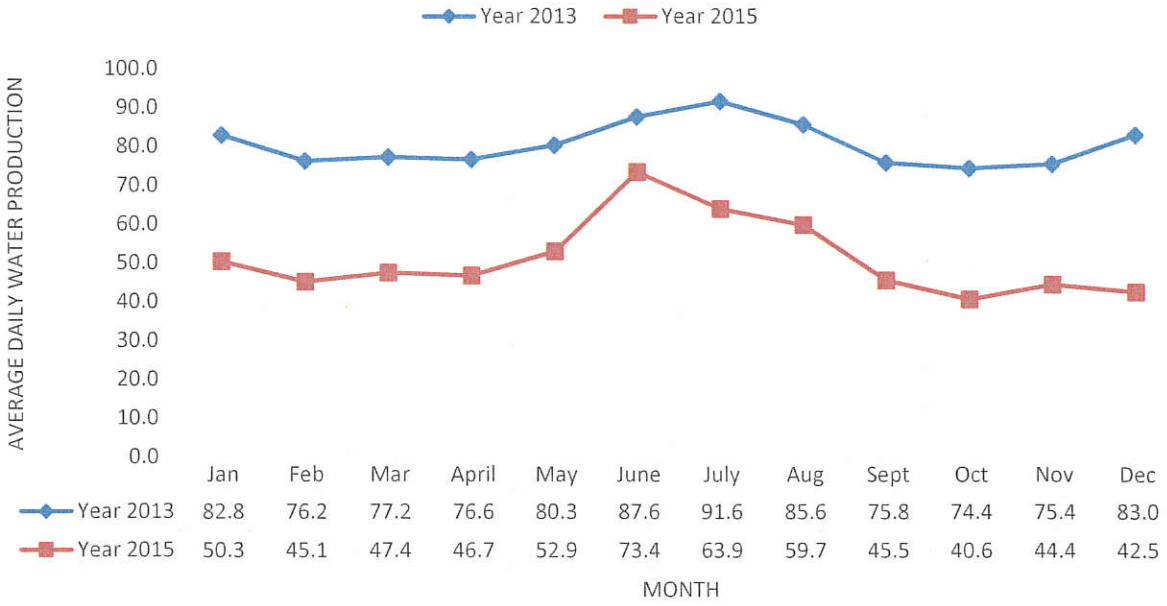
2014 and 2015. The calendar year 2014 water reduction shown in Table 3.11 (19%) only reflects 4 months reduced leakage. When isolating the water system loss for the months of August 2014 – January 2015 the percent loss was calculated to be 8.6%. Graph 3.1 below shows the average daily production for 2013 and 2015. It is clear that that average production rates were significantly reduced following the August 4th repair. Therefore, we believe a conservative projected loss for the system would be 8.6 %, however, we will use a projection of 10% in our future loss calculations. The 2008 WSP reported water losses over 40% and the water loss peaked at 60% in 2010.

TABLE 3.11 – NON-REVENUE WATER LOSS

Year	Metered Source Production	Authorized Consumption			Non-Revenue Water Loss	
		Revenue	Non-Revenue	Total		
	(gallons)	(gallons)	(gallons)	(gallons)	(gallons)	(%)
*2010**	*39,401,200*	*15,691,595*	*N/A*	*15,691,595*	*23,709,605*	*60*
2011	31,194,300	14,371,469	780,000	15,151,469	16,042,831	51
2012	30,510,700	15,097,432	86,420	15,183,852	15,326,848	50
2013	29,288,600	14,680,005	2,145,557	16,825,562	12,463,038	43
2014	26,418,900	16,042,744	2,525,595	18,568,339	7,850,561	30
2015	18,639,800	15,793,541	1,420,100	17,213,641	1,426,159	7.65
2013-2015 AVERAGE	**24,782,433**	**15,505,430**	**2,954,104**	**18,459,534**	**6,322,899**	**26.9**

*2010 water loss is based on metered production and metered revenue from City records.

GRAPH 3.1 AVERAGE DAILY WATER PRODUCTION (1,000 GALLONS) 2013 & 2015



	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Year 2013	82.8	76.2	77.2	76.6	80.3	87.6	91.6	85.6	75.8	74.4	75.4	83.0
Year 2015	50.3	45.1	47.4	46.7	52.9	73.4	63.9	59.7	45.5	40.6	44.4	42.5

WSDOH adopted the Water use Efficiency Rule under WAC 246-290-490 in September 2006 as part of the 2003 Municipal Water Law. The new rule set a maximum leakage standard of 10% in the distribution system of all Municipal Water Suppliers, and annual compliance with the leakage standard by 2011 for Municipal Water Suppliers with less than 1,000 connections. Since August 4th 2014 water main repair, the Vader-Enchanted Valley Water System has had a water loss of less than 10%. However, because the 3-year average system water losses exceed 10%, a water loss action plan has been developed to implement measures to reduce non-revenue water losses. The water loss action plan is in Appendix E.

3.5.4 Water Use Factors and Equivalent Residential Units (ERU)

The use of Equivalent Residential Unit (ERU) is a means to express all water use by non-residential customers. An ERU is a system-specific unit of measure to express the average consumption by one single-family residence. An ERU value for one system is not the same for another water system.

The value of an ERU is calculated by dividing the total volume of water for the residential customer class by the total number of **residential connections with usage**. Some water connections or active accounts have no water usage. ERU water demand is calculated using the residential consumption volume divided by the number of residential water connections with water usage. Water use by other customer classes and residential customers with no water usage can then be converted to a corresponding number of ERUs. Table 3.12 shows the historical ERU values from 2011 to 2015. Information about customer connections is provided in Table 3.8.

The four-year average is 118 gpd per ERU. However, due to the replacement of all of the residential meters in the system, an ERU value of 124 gpd, will be used in our calculations which reflects the more accurate ERU demand in 2015.

TABLE 3.12 – ERU ANALYSIS				
YEAR	RESIDENTIAL CONSUMPTION (gallons)	RESIDENTIAL CONSUMPTION (gpd)	#RESIDENTIAL CONNECTIONS w/ USAGE	ERU WATER DEMAND (gpd)
2011	13,758,059	37,693	329	115
2012	14,157,392	38,787	338	115
2013	13,822,306	37,869	331	114
2014	14,688,279	40,242	331	121
2015	15,239,952	41,753	336	124
ERU Water Demand				≈124

Table 3.13 shows the ERUs for all customer classes using the billed, authorized consumption in Table 3.8. Although the 2011-2015 average ERU water demand is 118 gallons per day, we will use a more conservative ERU water demand of 124 gpd. This rate is appropriate because all meters were replaced as a part of a CDBG/DWSRF funded capital improvement project, which likely contributed to the increase in ERU demand as many of the old meters did not register very low flows. Information about water consumption by customer classification is provided in Table 3.8, and about non-revenue water losses in Table 3.10. The system serves an averaged total of 694 ERUs.

TABLE 3.13 – ERU BY CUSTOMER CLASSIFICATION					
Year	#RESIDENTIAL ERU (1)	#COMMERCIAL ERU (2)	#OTHER AUTHORIZED ERU (3)	#NON-REVENUE ERU (4)	#TOTAL ERU
2011	337	14	18	379	748
2012	341	12	2	362	717
2013	340	17	51	294	703
2014	344	16	125	120	606
2015	347	10	31	32	420
AVERAGE	**347**	**14**	**46**	**238**	**639**

1) From Table 3.9, column 4.
2) From Table 3.8, column 4 divided by the ERU value of 124 gpd.
3) From Table 3.11, column 4 divided by the ERU value of 124 gpd.
4) From Table 3.11, column 6 divided by the ERU value of 124 gpd.

3.6 WATER DEMAND FORECAST

3.6.1 Demand Forecast Methodology

The methodology used to develop the demand forecast is outlined in this section. The forecast uses two time horizons (6-year and 20-year).

The forecast also factors in an industrial customer classification based on an industrial land use and zoning in the service area. The City of Vader approved a 28.74 acre area for industrial use and zoning in 2010. Although there has been no City issued development approvals or application for water service, our forecast includes an industrial water use category.

At this time, there is an automobile wrecking facility (German Auto) located in one of the four industrial zoned parcels. The proposed water demand for the automobile wrecking facility is 2 ERU. Recent news in January 2014 state the owner of German Auto is also interested in constructing medicinal marijuana growing and retail facilities on the four parcels. However, there have been no projections of water demand and water service applications provided to the Utility so no speculative demand projections are included in this WSP. According to Utility policy, an amendment to this WSP will be required and funded by future developers once a proposed project is approved by State and local regulatory agencies.

The process used to develop the demand forecast is described as the following steps in this section.

1. DEMOGRAPHICS – Demographics were developed as described in Section 3.4.

2. WATER USE FACTORS – Water use factors were developed as described in Section 3.5.

3. RETAIL DEMAND – The demand for residential and non-residential customer categories were made by multiplying the demographic projections in Step 1 with Step 2.

4. NON-REVENUE DEMAND – The sum of all demands was multiplied by the 2015 "non-revenue water, losses" percentage which is 7.65% of the authorized consumption as shown in Table 3.10.

   = 1,426,159 gal / (15,684,041+109,500+1,331,400+88,700+1,426,159) gal
   = 1,426,159 gal/18,639,800 gal
   = 0.765 x 100
   = 7.65%

5. TOTAL AVERAGE DAY DEMAND (ADD) – The ADD was calculated by adding the demands from Steps 1 through 4.

6. TOTAL MAXIMUM DAY DEMAND (MDD) – The MDD was derived from the water usage reports, adjusting for 2 anomolies (July 1, 2015 113,100 gpd and July 8, 2015 131,200 gpd). The MDD used is determined from water usage on June 26, 2015 = **96,500 gpd** for 420 ERUs therefore MDD = 230 gpd/ERU with a Peaking Factor of **1.85**.

7. PEAK HOUR DEMAND (PHD) – The PHD was derived by using the equation in the WSDOH Water System Design Manual, December 2009. The equation is:

   PHD = (MDD/1440)(C*N+F) + 18

Where, MDD = MDD in gpd/ERU
N = number of ERUs
C = 1.8 for N=251-550 & 1.6 for N>500
F = 225

8. CONSERVATION ADJUSTMENT – Steps 1 through 6 create a baseline demand forecast which is adjusted for conservation efforts by customers. Prior conservation goals were to reduce water loss to 10% by 2025 and to reduce average daily consumption per capita by 1 gallon.

   We have achieved the water loss goal, but the apparent consumption per day has risen due to the replacement of the residential meters. However, the ERU Demand of 124 gallons per day is still a relatively low ERU rate.

3.6.2 Water Demand Projections

The projected demands are summarized in Table 3.14.

TABLE 3.14 – WATER DEMAND FORECAST												
WATER USE CATEGORY	BASE (2015)				6-YEAR (2021)				20-YEAR (2035)			
	#ERU	DEMAND (gpd)			#ERU	DEMAND (gpd)			#ERU	DEMAND (gpd)		
		ADD	MDD	PHD		ADD	MDD	PHD		ADD	MDD	PHD
Residential	347	43,028	79,810	-	402	49,848	92,460	-	569	70,556	130,870	-
Commercial	10	1,240	2,300	-	19	2,356	4,370	-	24	2,976	5,520	-
Industrial	0	0	0	-	0	0	0	-	0	0	0	-
Other Authorized Use	32	3,968	7,360	-	32	3,968	7,360	-	32	3,968	7,360	-
Subtotal	389	48,236	89,470	-	453	56,172	104,190	-	625	77,500	143,750	-
System Leakage	31	3,844	7,130	-	50	6,200	11,500	-	69	8,556	15,870	-
TOTAL DEMAND WITHOUT CONSERVATION	**420**	**52,080**	**96,600**	**175 gpm**	**503**	**62,372**	**115,690**	**182* gpm**	**694**	**86,056**	**159,620**	**231* gpm**

ERU = 124 gpd/residential customer

* - Used C = 1.6